62D CONGRESS
2d Session

HOUSE OF REPRESENTATIVES

DOCUMENT
No. 246

PRESERVATION OF NIAGARA FALLS

MESSAGE FROM THE PRESIDENT OF THE UNITED STATES

TRANSMITTING

A LETTER FROM THE SECRETARY OF WAR, SUBMITTING ADDITIONAL INFORMATION CONCERNING THE OPERATION OF THE UNITED STATES LAKE SURVEY FROM JUNE 29, 1906, TO JUNE 29, 1911

DECEMBER 7, 1911.—Read, referred to the Committee on Foreign Affairs, and ordered to be printed, with illustrations.

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UNITED STATES OF AMERICA
GOVERNMENT PRINTING OFFICE

LETTER OF TRANSMITTAL.

To the Senate and House of Representatives:

Referring to my message of August 21, 1911, transmitting, for the information of Congress, reports of investigations made in connection with the proceedings of the War Department under the provisions of the act of Congress approved June 29, 1906, "For the control and regulation of the waters of Niagara River, for the preservation of Niagara Falls, and for other purposes," I transmit herewith a letter of the Secretary of War submitting additional information concerning the proceedings of that department, including a report of the operation of the United States Lake Survey from June 29, 1906, to June 29, 1911, which summarizes and supplements the reports of November 30, 1908, and September 21, 1909, above mentioned, and including, also, reports of the Niagara Falls Committee of September 20, 1907, and October 2, 1911, the latter of which furnishes a résumé of all of the operations of the committee to that date, and supplements the reports of April 13, 1908, and April 5, 1909, printed in House Document No. 431, Sixty-first Congress, second session.

WM. H. TAFT.

THE WHITE HOUSE, *December 7, 1911.*

PRESERVATION OF NIAGARA FALLS.

WAR DEPARTMENT,
Washington, November 9, 1911.

The PRESIDENT:

On August 19, 1911, I had the honor to submit to you reports dated November 30, 1908, and September 21, 1909, of investigations made in connection with the proceedings of the Secretary of War under the act of Congress approved June 29, 1906, for the preservation of Niagara Falls, which reports were transmitted to Congress with your message of August 21, 1911, and printed in Senate Document No. 105, Sixty-second Congress, first session. My letter concluded with the statement that a final report of the proceedings under that act would be included with my forthcoming annual report, which statement was repeated in your message. By joint resolution of Congress approved August 22, 1911, the provisions of the act of June 29, 1906, were extended to March 1, 1912, and, in view of the consideration which the entire question may receive at the next session of Congress, it is thought that it may be of greater public convenience to present the detailed information relating to the subject in special form rather than to combine it with the appendixes accompanying my annual report.

I have therefore the honor to submit to you, with the recommendation that they be transmitted to Congress, a comprehensive report of the operations of the United States Lake Survey, under appropriation "Preservation of Niagara Falls," from June 29, 1906, to June 29, 1911, which summarizes and supplements the reports of November 30, 1908, and September 21, 1909, printed in Senate Document No. 105, Sixty-second Congress, first session, as previously stated; also a report of the chairman pro tempore of the Niagara Falls committee, dated September 20, 1907; also a report of the chairman of the Niagara Falls committee, dated October 2, 1911, giving a résumé of all of the operations of the committee to that date and supplementing the reports of April 13, 1908, and April 5, 1909, printed in House Document No. 431, Sixty-first Congress, second session.

Very respectfully,

H. L. STIMSON, *Secretary of War.*

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, October 20, 1911.

The SECRETARY OF WAR.

SIR: 1. I have the honor to submit herewith a report of Lieut. Col. Charles S. Riché, Corps of Engineers, the officer in charge of the Survey of the Northern and Northwestern Lakes, concerning the operations of the Lake Survey during the period extending from June 29, 1906, to June 29, 1911, conducted by direction of the Secretary of War in connection with his proceedings under the provisions of the act of Congress approved June 29, 1906, "For the control and regulation of the waters of Niagara River, for the preservation of Niagara Falls, and for other purposes."

2. Referring to the letter of the Secretary of War of August 19, 1911, submitting to the President special reports by the officer in charge of the Lake Survey, dated November 30, 1908, and September 21, 1909, upon the investigations at Niagara Falls, and to the message of the President of August 21, 1911, transmitting the reports to Congress, it is recommended that the report now submitted, together with the report of the operations of the Niagara Falls Committee submitted by its chairman to the Secretary of War October 2, 1911, be included with the forthcoming annual report of the Secretary of War.

Very respectfully,

W. H. BIXBY,
Chief of Engineers, United States Army.

REPORT OF OPERATIONS OF THE U. S. LAKE SURVEY.

Under appropriation, "Preservation of Niagara Falls," June 29, 1906, to June 29, 1911.

UNITED STATES LAKE SURVEY OFFICE,
OLD CUSTOMHOUSE,
Detroit, Mich., September 30, 1911.

The CHIEF OF ENGINEERS,
United States Army, Washington, D. C.

GENERAL: In accordance with instructions in department letter of August 25, 1911, I have the honor to submit herewith a summarized statement of the operations of the Lake Survey Office under appropriation "Preservation of Niagara Falls" from June 29, 1906, to June 29, 1911.

* * * * * * * * *

Very respectfully, your obedient servant,

C. S. RICHÉ,
Lieutenant Colonel, Corps of Engineers.

Under the provisions of the act of Congress approved June 29, 1906, entitled "An act for the control and regulation of the waters of Niagara River, for the preservation of Niagara Falls, and for other purposes," the Secretary of War was authorized to grant permits for the diversion, in the United States, of water from the Niagara River and its tributaries, not exceeding to any one individual, company, or corporation a maximum amount of 8,600 cubic feet per second, and not exceeding for all permits a total of 15,600 cubic feet per second. The Secretary of War was further authorized to grant revocable permits for the diversion of additional amounts of water after the full amount of 15,600 cubic feet had been diverted in the State of New York for a period of not less than six months, and then only to such an extent as "in connection with the amount diverted on the Canadian side shall not injure or interfere with the navigable capacity of said river, or its integrity or proper volume as a boundary stream, or the scenic grandeur of Niagara Falls."

The consideration of the various technical questions involved in enforcing the provisions of this act, the supervision of power and transmission companies operating under permits issued in accordance therewith, and the field operations for determining the extent and effects of diversions have been largely delegated to the officers in charge of the Lake Survey under various allotments from the appropriation provided by section 6 of this act. A résumé of these operations previous to 1908 is given in the following extract from the special report of Maj. Charles Keller, Corps of Engineers, to the Chief of Engineers, dated November 30 of that year.[1]

On July 17, 1906, the Chief of Engineers called the attention of the officer then in charge of the Lake Survey, the late Lieut. Col. James L. Lusk, Corps of Engineers, to these provisions (sec. 2) of the above act, and directed him to consider the problems involved in enforcing them, and to make such arrangements as could be made to furnish the information that would undoubtedly be called for, in connection with the questions arising during the life of the act.

With this in view, a party belonging to the Lake Survey, then in the field for the purpose of making surveys needed to modernize the charts of the head and of the mouth of the Niagara River, was directed to perform the necessary triangulation, run level lines, take topography and hydrography, and to do such other instrumental work, at and in the immediate vicinity of Niagara Falls, as would be needed in making an accurate chart of the Falls, including the crest-line of the American Fall and soundings in its approaches. Further, this party, which had already established automatic gauges at the mouth of Black Creek, at Chippawa, and at the Whirlpool on the Canadian side, and at Suspension Bridge and Lewiston on the American side, in August, 1906, installed an additional small, self-registering gage at Willow Island, abreast of the head of Goat Island in the approach to the American Fall, and, in November, 1906, two gauges of the same kind at Prospect Point, just above the north end of the crest of the American Fall, and at Terrapin Point at the east end of the crest of the Horseshoe Fall. These gauges were operated until freezing weather in December, except that at Suspension Bridge, which was carried away by high water in October, and those at the Whirlpool and Lewiston, which were discontinued November 10, 1906.

[1] Printed in S. Doc. No. 105, Sixty-second Congress, first session.

As a result of this work, a preliminary report, dated November 21, 1906, was submitted to the Chief of Engineers, outlining a program of observations and measurements necessary and desirable in determining the effect of the diversion authorized in the act, and this was followed by another report, dated January 30, 1907, in which the final results of the fieldwork were stated and the above program reaffirmed.

On April 23, 1907, the Chief of Engineers informed this office that the sum of $5,000, from the appropriation made by section 6 of the act approved June 29, 1906, had been allotted for the purpose of "such observations and to carry on such operations as may be necessary to determine whether the diversion of the authorized amount of 15,600 cubic feet per second from the American side, in connection with that to be diverted on the Canadian side for the development of 160,000 horsepower, injures or interferes with the navigable capacity of said river, or with its integrity and proper volume as a boundary stream, or with the scenic grandeur of Niagara Falls."

The "navigable capacity" of the Niagara River is dependent on its depth and velocity, and these are measurable elements. Its "integrity and proper volume as a boundary stream" are questions of fact which can be determined from measurements of discharge and from suitable surveys. The "scenic grandeur of Niagara Falls" appears, on the other hand, to be dependent on opinion and sentiment, and it seems almost absurd to attempt to demonstrate, by physical measurement of any kind, what the effect of the above diversion, or of any diversion, will be upon the Falls, considered solely as a spectacle. If, however, it be conceded that the "scenic grandeur" of the Falls is dependent largely, if not exclusively, upon the awe with which they impress the spectator, and that this sensation is due to the irresistible power of their enormous volume of flow and upon the height of fall, then even grandeur is susceptible of measurement, since reduction in volume and height will measurably, if not sensibly, affect the Falls as a spectacle. Moreover, the effect produced by the Falls is intimately connected with unity of sensation, and this is seriously disturbed by breaks in the crest lines, which follow reduction in volume. Accordingly, the questions raised in the act of June 29, 1906, may all be answered by the ascertainment of the law connecting volume of discharge with river and lake height, and by means of surveys showing profiles, bottom configurations, current directions, and crest lines.

The project of April 30, 1907, for the expenditure of the allotment of $5,000 above mentioned, therefore covered field operations, which included investigations of hydraulic conditions by means of measurement of flow, by observations of profiles, by soundings, and by ascertainment of current lines at and immediately above the falls.

The measurement of the flow of the river was intended to serve as a test of the law of discharge derived from the observations of 1898–1900, made at the International Bridge at Buffalo. This law, modified if rendered necessary by the altered conditions, would serve, when the law of change of surface profile at the various significant points had been fully established, to determine the effects of diversions on the falls and on water levels at other localities. It was further proposed to measure the approximate volume of flow of the American Fall, while the measurement of the flow in the canals of the two American power companies was a necessary part of the project.

Field operations were begun late in May, 1907. Automatic gauges were established at Austin Street in Black Rock, Chippawa, Grass Island, Whirlpool, and at Suspension Bridge, and the operation of the permanent Lake Survey self-register at Buffalo Breakwater Light Station was, of course, continued.

During June the crest line of the American Fall was redetermined and shown to be practically the same as at the time of the last determination, in 1875. The survey of 1906 had shown a retreat of the mean trend of the apex of the Horseshoe Fall, since this time, of 170 feet. In September, November, and December discharge observations were made in the canals of the two American power companies, and in October and November 40 discharge measurements of the Niagara River were made at the International Bridge. In November and December the discharge over the American Fall was measured by a series of float observations. The flow of the Erie Canal was also measured and float observations were also made to determine more definitely the depths and the configuration of the river bed above the Horseshoe Fall.

While the field work of the autumn of 1907 had furnished sufficiently definite results, during the reduction and plotting of these observations, in the winter of 1907–8 it became evident that, in order to confirm the validity of the conclusions derived from the work of the field season of 1907, additional gauge and discharge observations would be desirable.

Accordingly, in May, 1908, a recommendation was made to the Chief of Engineers that an additional allotment of $3,000 be made from the appropriation of the act of June 29, 1906, for the purpose of enabling about 60 more measurements of discharge at the International Bridge to be made and for continuing, during the open-water season of 1908, the gauges used in the slope observations of 1907. It was also proposed to take advantage of the opportunity offered by a coming complete shutdown of the Niagara Falls Power Co., to test the validity of conclusions already made and to observe effects consequent upon so radical a change in the diversion conditions. These recommendations having been approved by the Chief of Engineers, the requested allotment was made by the Secretary of War on May 18, 1908.

Field operations were inaugurated and continued during the season of 1908 in accordance with the project upon which this last allotment was made. The gauges of 1907 were reestablished and additional gauges were placed at Schlossers Dock (Echota), on the American side, and above the Horseshoe Fall on the Canadian side. Of these, the ones at Austin Street, Schlossers Dock, and Wing Dam were removed late in August after suspension of discharge measurements at the International Bridge, and the others were operated until freezing weather made their removal necessary. The measurements of river flow at the standard bridge section were resumed in June, 1908, and upon the suspension of field work in August 78 independent determinations of the discharge had been made.

Eight additional measurements made in October by the hydraulic party on its return trip from the St. Lawrence River concluded the discharge work in the Niagara River up to the present time. The results of the 126 measurements taken during 1907–8 are summarized on pages 2503–2505, Annual Report of the Chief of Engineers for 1909.

Extensive preparations were made to observe the effect on river slopes during the shutdown of the Niagara Falls Power Co. on June 14, 1908, and valuable information was expected from the observations. Unfortunately, this shutdown, which was of short duration, was accompanied by a storm on Lake Erie, and the abnormal conditions in the river obscured the effect of the decreased diversion. An examination by the power company at this time revealed the necessity of repairs to the tailrace tunnel and to the bridge abutment at its outlet, and accordingly a second shutdown, aggregating practically 10 days, was made in July and August. Preparations were then again made for special observations to determine the effect of decreased diversion on the slopes and flow in the Niagara River. The Niagara Falls Hydraulic Power & Manufacturing Co. offered its cooperation to the extent of materially increasing its diversion for a short period and then practically closing down, thus largely increasing the range in amount of diverted water. During the period of shutdown automatic gauges were carefully watched, and to make certain of continuous records at the critical points 10-minute staff-gauge readings were taken day and night at Buffalo and at Austin Street, Black Rock. Additional staff gauges were also maintained at Prospect Point on the crest of the American Fall, in the canals of the two American companies, and in the approach to the Ontario Co.'s intake. The discharge measurements at the International Bridge, together with measurements of flow in the Hydraulic Company's canal, were continued daily throughout the period of shutdown. Prior to the shutdown and after resumption the flow in the canals of both American companies was observed.

Weather conditions were excellent during these tests, and the results were highly satisfactory and extremely valuable. The mean condition of the river for the period of 10 days' shut-down compared with that preceding and following gives a positive basis of determining the effects of diversion by the American companies on river slopes, on the level of Lake Erie, and on the relative volumes of flow over the American and Horseshoe Falls.

The results of the 1907–8 hydraulic work on the Niagara, the study of slopes, flow lines, and other natural characteristics of the river, and the effects of diversions by the power companies on navigable capacity of the river, on its integrity as a boundary stream, and on the scenic grandeur of Niagara Falls are well set forth in the comprehensive report of November 30, 1908, by Maj. Charles Keller, Corps of Engineers. (S. Doc. No. 105, 62d Cong., 1st sess.)

Based on the data of discharge measurements made in the canal of the Niagara Falls Power Co. in 1907, Maj. C. W. Kutz, Corps of Engineers, then in charge of supervision of power and transmission companies operating under War Department permits, had prescribed for this company a limitation of 65,000 horsepower output, measured at the switchboard. The operating conditions in practice at that time, when the capacity of the discharge tunnel and the economical operation of the plant were not fully understood, made this limitation logical. The low efficiency which this development represented aroused a sense of the possibilities of the plant under efficient operation, and early in the spring of 1909 the company made representation that this limitation did not represent the capacity of the plant for the limiting diversion of 8,600 cubic feet of water per second. With the realization that the limitation prescribed deprived the company of rights to which it was entitled, a project was presented on April 3, 1909, looking to an exhaustive series of tests to determine the output of power and the consumption of water under various conditions of operation.

The approval of the project on April 15 carried an allotment of $5,000 and field operations under direction of the Lake Survey office began on May 4, 1909. During the season 336 measurements of flow in the canal of the power company were made, covering, according to a prearranged program, 53 test conditions of operation of the plant. By the graphic construction of efficiency curves for the generating units in the two power houses, as determined by these measurements, a table was prepared embodying the practicable operating combinations and the corresponding switchboard limitations whereby the total diversion of water should in no case exceed the limit prescribed by law. This table is published on page 2724, report of the Chief of Engineers for 1910. It was determined by the measurements that, in addition to the maximum capacity of the International Paper Co.—

a tenant of the Niagara Falls Power Co.—the latter could generate in 1909 about 82,000 electrical horsepower at the switchboard without exceeding the allowable diversion as prescribed by its permit.

The diversion of the Niagara Falls Hydraulic Power & Manufacturing Co. was measured at a selected section in its canal in 1909, and by deducting the reported consumption of water by tenant companies it was determined that the Hydraulic Company was then developing 16.6 horsepower per cubic foot of water per second through its own turbines. The maximum flow observed in its canal was then about 4,000 cubic feet per second, or about 60 per cent of the maximum under its permit.

For the purpose of further strengthening the determination of slope relations in the Niagara River and of observing the effects of increased diversions, the automatic gauges at Grass Island, Horseshoe Falls (above the falls on the Canadian side), Suspension Bridge, and Whirlpool were maintained during the season of 1909.

During the season of 1910 the gauge formerly at Grass Island was operated at Chippawa, Ontario, and the other three gauges were continued in their former positions.

The funds from previous allotments having become exhausted, the Secretary of War on June 17, 1910, allotted to the Lake Survey an additional sum of $1,000, to defray the expenses of continued investigation of slope relations in the Niagara River, the supervision of power and transmission companies at Niagara Falls which had been delegated to the Lake Survey office since August 14, 1908, and for incidental investigations.

In the fall of 1910 the Niagara Falls Power Co. completed the remodeling of one of the generating units in its power house No. 1 by the substitution of an improved turbine and the addition of a draft tube. Upon the representation of the company that by the increased mechanical efficiency of this unit it was entitled to a modification of the imposed limitations, the Lake Survey cooperated in conducting a series of tests to determine the effect of the improvements. While the results were unsatisfactory, due to the use of a defective instrument, they appeared to demonstrate conclusively that the remodeled unit is fully as efficient as those in power house No. 2. As further tests would have required extensive preparations impossible to complete before the formation of ice in the canal, the following table was prepared, based on the assumption that the remodeled unit in power house No. 1 is equivalent in efficiency to the units in power house No. 2. The revised table of limitations is supplemental to that previously used and is operative only when the remodeled unit in power house No. 1 is in operation. This table became effective November 3, 1910.

Table of operating limitations of Niagara Falls Power Co., effective after Nov. 3, 1910.

Units in operation, including No. 10, power house No. 1.			Permissible output.			
			Valve in No. 1 no less than 50 per cent.		Valve in No. 1 no less than 75 per cent.	
Total.	No. 1.	No. 2.	Kilowatts.	Approximate horsepower.	Kilowatts.	Approximate horsepower.
15	4	11	(1)	(1)	(1)	(1)
15	5	10	(1)	(1)	(1)	(1)
15	6	9	(1)	(1)	(1)	(1)
15	7	8	(1)	(1)	(1)	(1)
15	8	7	(1)	(1)	(1)	(1)
16	5	11	62,200	83,300	02,200	83,300
16	6	10	60,400	80,900	00,400	80,900
16	7	9	58,600	78,500	58,600	78,500
16	8	8	56,900	76,200	56,900	76,200
16	9	7	55,100	73,800	55,300	74,100
17	6	11	56,500	75,700	56,800	76,100
17	7	10	55,200	74,000	55,200	74,000
17	8	9	53,400	71,600	53,400	71,600
17	9	8	52,100	69,800	52,100	69,800
18	7	11	51,500	69,000	52,600	70,500
18	8	10	49,900	66,900	51,500	69,000
18	9	9	48,200	64,600	50,200	67,300
19	8	11	47,200	63,200	49,900	66,900
19	9	10	45,400	60,800	49,000	65,700
Operation not limited.			41,500 kilowatts.		55,600 horsepower.	

[1] Unlimited.

NOTE.—This schedule is based on 7,875 c. f. s. of water available in plant of Niagara Falls Power Co. and 725 c. f. s. in the plant of the International Paper Co.

In consideration of the possible expiration of the Burton Act on June 29, 1911, no further tests were demanded in the spring, and the limitations previously established for the output of the Niagara Falls Power Co. were continued in use until the lapse of the permits issued under the act.

During the winter of 1910–11 the gauge records taken in the Niagara River during the two previous seasons were reduced in the office, and an elaborate study was made of the slope relations and the changes therein during the operation of the act, due to changes in regimen and to increased diversions of water by the power companies.

There were no field operations undertaken during the season of 1911, previous to June 29, other than the continued supervision of the power and transmission companies.

On January 20, 1911, an additional allotment of $2,000 was made to defray office and supervision expenses and to allow of continued office reductions. Of this allotment an unexpended balance of $250.73 was refunded to the Treasury on July 29.

Amounts aggregating $2,797.71 have been disbursed for salaries and miscellaneous expenses of the Niagara Falls Committee, an allotment of $2,000 having been made for this purpose and the balance being paid from the various allotments to the Lake Survey. In addition to this total, liabilities on account of this committee incurred prior to June 29, 1911, amounting to $710.87, have since been settled by the Lake Survey from funds allotted for the purpose.

The foregoing is a brief statement of the various projects and allotments and of the operations under them.

The Niagara River, the natural outlet for surplus waters of the four upper bodies of the Great Lakes and their drainage basins, has its head or source in the the eastern end of Lake Erie, flowing in a general northerly direction for a distance of about 35 miles and emptying into the westerly end of Lake Ontario. For mean stages of Lakes Erie and Ontario, 1860–1910, it has a total fall of 326.38 feet and a discharge of 210,000 cubic feet of water per second, which, incidentally, represents a theoretical energy of nearly 8,000,000 horsepower. The river is divided by nature into alternate basins or pools, and rapids or cataracts, the characteristics of which have important bearings on the measurements of river flow and the effects of the various diversions. The pools, in downstream order, are: First, Lake Erie; second, the Grass Island-Chippawa pool, extending from Squaw Island to the upper rapids; third, the Upper Gorge, extending from the foot of the falls to Suspension Bridge; fourth, the Whirlpool; and fifth, the lower river below Lewiston and including Lake Ontario. The connecting rapids, cascades, and cataracts are similar in effect to artificial dams or weirs and are subject to practically the same natural laws. The first and second pools are connected by a rapids of comparatively slight fall (about 5 feet) and of gradual and continuous descent. The second weir extends from the upper cascade, through the upper rapids and the two falls, with a total fall of 222 feet. The third weir includes the Whirlpool Rapids, with a fall of about 48 feet; and the fall from the Whirlpool to Lewiston is 47 feet. It is evident from the above that the height of water in any one of the three lower pools has no effect on those above.

On the contrary, it has been positively demonstrated by the measurements of flow in the upper Niagara River, and by the observations of the effects of the shutdown in 1908 of the Niagara Falls Power Co., that local conditions in the Grass Island-Chippawa pool, and, consequently, the effect of diversions from this pool, extend upstream through the rapids at the International Bridge to Lake Erie. It was found that a diversion of 10,000 cubic feet per second from the Grass Island-Chippawa pool would momentarily increase the discharge over the upper weir by about 1,000 cubic feet per second, resulting in an ultimate lowering of Lake Erie, to compensate for this increased flow, of slightly over one-half inch. From the fact that several cascades with practically free overfalls intervene between the Grass Island-Chippawa pool and the intakes of the Electrical Development Co. and the Canadian Niagara Power Co., it is evident that the diversions of these companies can have no effects on the stages of water in and above this second pool, and as there is no commercial navigation between this pool and Lewiston it is only the diversion of those companies drawing water from the Grass Island-Chippawa pool, or above, that can "injure or interfere with the navigable capacity of the river." For the consideration of this question, then, only the diversions of water by the Ontario Power Co., the Niagara Falls Power Co., and the Niagara Falls Hydraulic Power & Manufacturing Co., all taking water from the second pool, and the diversions from the

Erie Canal, which in effect are diversions from Lake Erie, are relevant. The Lockport Hydraulic Co., at Lockport, N. Y., has been using until lately its maximum limit of 500 cubic feet per second in addition to the amount by-passed for maintenance of the Erie Canal.

Based on the relation of Lake Erie stages and the Niagara River outflow, this diversion results in a lowering at Buffalo of 0.02 foot, with about one-half of this effect extended to the pool below. The estimated diversion in June, 1911, from the Grass Island-Chippawa pool of 17,100 second-feet results in a lowering in this immediate vicinity of 0.44 foot, with a corresponding lowering in Lake Erie of 0.08 foot. The total effects, then, of the present diversions, so far as they affect navigation on the Niagara River, are the lowering of Lake Erie 1⅛ inches and of the upper Niagara River from 1¼ inches at Austin Street to 5½ inches at the head of the rapids above the Falls. The lowering of Lake Erie disturbs the natural slopes of Detroit and St. Clair Rivers and results in a slight lowering on Lakes Michigan and Huron and on St. Marys River below the locks. Though the changes are slight, practically the entire commerce of the Lakes above Niagara is affected. With an appreciation of the immense cost and the value to commercial interests of increased depths in the harbors and connecting rivers of the Great Lakes, the detrimental effects to navigation of diversions from the Niagara River can not be considered negligible.

However, the commerce in the Niagara River below Tonawanda is at present insignificant and that in the river above is little if any affected by the small changes shown. It may be stated, therefore, that the present diversions, and the additional amounts necessary to bring the total to the limits of the Burton Act, so called, will not injure or interfere with the navigable capacity of the Niagara River.

As to the effects of diversions, to the extent at present authorized, on the integrity and proper volume of the Niagara River as a boundary stream, it is not apparent that the river through these diversions has suffered. The upper and lower river still continue to discharge approximately the same volume of water, the diminished flow being only over the cataracts and the rapids immediately above. Over this portion the stream, while appreciably decreased, still maintains sufficient width and depth to effectively delimit the boundary. Moreover, it remains impassable and continues to discharge immensely more than many of the smaller international boundary streams and has considerably more than double the flow of the St. Marys River.

The extent of the injury to or interference with the scenic grandeur of Niagara Falls caused by present and authorized diversions may be best determined by a consideration of the effect of these diversions on the depth and volume of flow over the cataracts and on the continuity of the crest lines, for on these depends largely the character of spectacle that it is desired to preserve.

In 1907 the flow over the American Fall was measured with floats in the channel near the head of Goat Island and was determined to be 9,916 cubic feet per second. Lake Erie at the time was at an elevation of 572.41 feet, corresponding to a discharge in the upper river of about 205,000 cubic feet per second. The flow over the American Fall was therefore less than 5 per cent of the total flow of the river. Naturally it might be supposed that the diversions of the American companies, with their intakes both less than a mile above the head of Goat Island, would have a relatively large effect in decreasing the volume of flow over the American Fall, especially as their diversions exceed in amount the normal flow in the American channel. The observations during the shutdown of the American companies in 1908, when about 6,200 cubic feet per second were restored to the river, showed conclusively, however, that their diversions are for the most part drawn from waters that would naturally flow to the westward of Goat Island, and that the effects on elevations in the American channel are only about one-third of the effects of like diversions from Lake Erie or the upper river. The actual change shown by a comparison of the means of two 10-day periods was a rise, due to the decreased diversion, of 0.012 foot at the Prospect Point gauge, situated at the northeast end of the American Fall, and a simultaneous rise of 0.037 foot at Wing Dam gauge opposite the head of Goat Island. Based on this comparison, it is determined that the total authorized diversion of the American companies, together with the present consumption of the Ontario company, will lower the depth on the American Fall about ⅝ inch and decrease the volume of flow about 5 per cent. As the lowering will result in unwatering little if any of the crest line, and as the decreased flow will be scarcely appreciable, it may be considered that the changes on the American Fall are unimportant.

The depth and volume of flow over the Horseshoe Fall are directly affected, not only by the diversions from the Grass Island-Chippawa pool and from Lake Erie, but by those from below the upper cascade, and here are found the really harmful scenic effects of the diversions. By established gauge relations it is determined that the height of water at Terrapin Point, at the Goat Island end of the Horseshoe, is lowered 0.11 foot for each 10,000 cubic feet per second diversion, and the corresponding effect at the Canadian end of the fall is 0.27 foot. For the authorized diversion in the United States of 15,600 cubic feet per second and the estimated diversion on the Canadian side in June, 1911, of 11,000 cubic feet, it is determined that the Horseshoe is lowered 0.29 foot at the Goat Island end and 0.72 foot at the Canadian end, and that the mean volume of flow is decreased 15 to 20 per cent. A large part of the water descending the Horseshoe Fall passes over the center or apex. The recession of this portion of the crest line, due to the enormous flow, is progressing at a rate of about 5 feet per year. In turn, the overflow is becoming more concentrated, and the depths on other portions of the crest are necessarily being decreased. Gauge relations indicate that the surplus over the apex is drawn principally from the Canadian shore. Since 1906, the effect has been a lowering, at mean stages, of one-half foot over the west end of the fall. The effect then of the total diversions, and of the natural change of regimen since 1906, will account for lowerings on the Canadian and Goat Island ends of the falls, at mean lake level, of 15 inches and 3½ inches, respectively. The present return of low stages on the Great Lakes, due to deficiency in rainfall and run-off, has had the further natural effect of lowering the water at the west end of the fall 5 inches with a similar effect at Terrapin Point of 2 inches. The total changes have resulted in an appreciable decrease in the volume of flow and, due to the deficient depths at the ends of the falls, to a marked interference with the continuity and length of crest line, unquestionably marring the natural beauty of this cataract. While natural causes have been chiefly instrumental in effecting these changes, it appears indisputable that the artificial diversions of the power companies have materially added to the "injury or interference with the scenic grandeur of Niagara Falls." Additional diversions, now contemplated, will increase this damage.

Under authority of the act of Congress approved June 29, 1906, the Secretary of War has issued permits for the diversion, in the United States, of water from the Niagara River and its tributaries, or for the transmission of power from the Dominion of Canada into the United States, to six separate companies or corporations, briefly as follows:

August 16, 1907.—To the Niagara Falls Power Co., for a maximum diversion of 8,600 cubic feet per second from the Niagara River.

August 16, 1907.—To the Niagara Falls Hydraulic Power & Manufacturing Co. (corporate name since changed to Hydraulic Power Co.), for a maximum diversion of 6,500 cubic feet per second from the Niagara River.

August 16, 1907.—To the Lockport Hydraulic Co. (rights later assigned to Hydraulic Race Co.), for a maximum diversion of 500 cubic feet per second from the Erie Canal; this in addition to the by-passing of sufficient water to operate the canal.

August 16, 1907.—To the Niagara Falls Power Co., to receive from the Canadian Niagara Power Co., at the international boundary line, and to transmit from the Dominion of Canada into the United States, 52,500 electrical horsepower; such electrical power to be received in the United States in the first instance by the Niagara Falls Power Co. or its distributing agents, or others with whom it or the Canadian Niagara Power Co. has or hereafter may have contracts for power delivery in the United States.

August 17, 1907.—To the Niagara Falls Electrical Transmission Co., and to the Cataract Power & Conduit Co., and to such other distributing agents or companies in the United States as the Electrical Development Co. of Ontario (Ltd.) may designate to receive from the said Electrical Development Co. of Ontario (Ltd.) at the international boundary line and to transmit into the United States 46,000 electrical horsepower, provided that a part of such electrical power may be received by the Cataract Power & Transmission Co. at the international boundary over the power transmission lines of the Canadian Niagara Power Co., and that the remaining part of such electrical power may be transmitted into the United States over transmission circuits thereafter to be approved by the Chief of Engineers, and may be received by the said Niagara Falls Electrical Transmission Co., or such other distributing agents or companies in the United States as the said The Electrical Development Co. of Ontario (Ltd.) may designate.

August 16, 1907.—To the Niagara, Lockport & Ontario Power Co., to receive from the Ontario Power Co. of Niagara Falls at the international boundary line, and to transmit into the United States, 60,000 electrical horsepower.

The permits for transmission of power provide also for submission to the Chief of Engineers, for approval, of plans showing the location of all lines or circuits over which power enters the United States then or thereafter, and each permit indicates the place and manner of determining the amount of power.

All of the above-named original permits for diversion of water and for transmission of power into the United States have continued in force, without intermission or alteration, to June 29, 1911, and no others, revocable or otherwise, have been issued.

The operations of the several companies under their respective permits were supervised by Capt. C. W. Kutz, Corps of Engineers, United States Army, up to August 14, 1908; since that date the duty has been delegated to the officer in charge of the Lake Survey. Frequent and thorough inspections of the several power plants have been made, and the diversions, power developments, improvements, etc., have been closely watched. Previous to 1909, the inspections were made principally by the officer in charge upon special visits for that purpose, but the rapidly increasing development of several of the companies made this method inadequate, and, during the last two years, when a field party has not been on the ground, inspections have been made by a Government employee permanently stationed at Niagara Falls. Occasional investigations by the Army officer in charge have verified in a general way the reports of inspections. The plants of the Niagara Falls Power Co. and the Canadian Niagara Power Co. have recently been visited semiweekly, and the operating conditions, switchboard readings, nature and extent of improvements, if any, since last inspection, and other pertinent data have been noted, and together with similar data of weekly inspections of other Niagara Falls companies have been regularly reported to the Lake Survey office. Summaries of these reports have been duly submitted to the Chief of Engineers.

Field operations, as noted earlier in this report, have been conducted from time to time, to simplify and increase the efficiency of supervision. The generating units of the Niagara Falls Power Co. have been calibrated as heretofore described, and the aggregate output of power for various practicable operating conditions, corresponding to the allowable diversion, have been determined. It is now possible at any time to know the amount of diversion by means of switchboard readings, and supervision under these arrangements has consisted principally of observing the output of power to see that the limitations of the permit were not violated.

The approximate relation of output and diversion in the power houses of the Niagara Falls Hydraulic Power & Manufacturing Co. has also been determined, and the June inspections indicate that the capacity of its plant was still well below the allowable limit. No precise method for determining the maximum diversion of this company for any stated time has yet been attempted, but the extensive improvements under way and the rapidly increasing use of water will soon make more efficient methods of supervision necessary if the original permit is to be continued.

Occasional inspections of the Lockport Hydraulic Co.'s plant at Lockport, N. Y., have shown that its development has at no time exceeded the capacity allowed under the permit, and its supervision has therefore been largely perfunctory. On December 1, 1910, the Hydraulic Race Co., assignee of the Lockport Hydraulic Co., made application for a new permit revised in terms to secure to the company the right to divert 500 cubic feet of water per second for power purposes, irrespective of the increased amount which will be required for navigation purposes by the enlargement of the Erie Canal into a barge canal. A special report on the matter was prepared in the Lake Survey office, and upon consideration the Chief of Engineers advised that the clause in the original permit reciting and explaining the uses of water by the canal for navigation purposes did not affect the right granted for the diversion of 500 cubic feet per second for power purposes, and the Secretary of War accordingly notified the company that "the existing permit will therefore be construed, so long as it is in force, as conferring the right to divert 500 cubic feet of water per second for power purposes, independent of the amount which may be required for navigation, subject to the conditions contained therein." It is understood that manufacturing plants now planned or under construction will lease and fully utilize the additional water made available by the increased diversions of the canal.

The supervision of transmission companies importing power into the United States has consisted since its delegation to the Lake Survey of occasionally verifying the location, number and size of power circuits, and of frequently inspecting the generating power houses and receiving stations. The total amount of power being generated at each power house, the amount being transmitted into the United States, and the amount at the same time being received within the United

States, have been noted at the time of each inspection, together with the maximum amounts, in each case, as shown by the continuous records, since previous inspections.

In so far as the inspections disclose, the several companies diverting water in the United States from the Niagara River, or receiving electrical power in the United States transmitted from Canada, have at all times complied with the provisions of their permits. On June 29, 1911, the plants of the Niagara Falls Power Co. and of the Canadian Niagara Power Co. were the only ones with sufficient capacity and equipment to approach or exceed the prescribed operating limitations. The Niagara Falls Hydraulic Power & Manufacturing Co. is making extensive alterations and additions to its plant and, as previously stated, will soon be in position to consume its maximum allowance of water. This company has, since the early inspections under its permit, closed down several of the diversions from its canal that were being used by tenant companies under very low efficiencies, and instead thereof has been supplying the mills with electrical power from its own generators, thereby greatly increasing the economical use of its diversion.

The International Railway Co., which is incorporated in the State of New York and in the Dominion of Canada, owns and operates all the electric railways in Buffalo, Tonawanda, Lockport, Niagara Falls, Lewiston, and in the intervening towns and country in New York and along the Niagara River from Chippawa to Queenstown in Canada. Its power plant is situated in the Queen Victoria Niagara Falls Park, on the Canadian side, and its power is generated by water diverted from the Niagara River just above the western end of the Horseshoe. In 1906 Capt. (now Major) C. W. Kutz reported that the machinery then installed had a capacity of 3,600 electrical horsepower, with an effective head of 68 feet, and that from 800 to 1,200 horsepower were then used by its Canadian lines. The company at that time claimed the right to export the additional power for use on its own lines, but as this question was in dispute with the Dominion Government, the consideration of the company's application to transmit 8,000 electrical horsepower into the United States has been held in abeyance, and it is understood that the rights of the company under its charter are still unsettled. The Lake Survey has had no supervision over this company, and in the consideration of hydraulic problems has been able to obtain only very meager data regarding its diversion or output. In answer to a recent request, the general manager reported to this office that on and about June 29, 1911, the company was generating 9,000 kilowatt hours per day, with an operating head of 64 feet, and that the estimated diversion averaged 110 cubic feet per second, with maximum diversions amounting to 180 second-feet. These amounts have been used in the appropriate estimates in this report.

The estimated average diversions of water by the several power companies in June, 1911, are as follows:

	Cubic foot-seconds.
Lockport Hydraulic Co	400
Niagara Falls Power Co	7,870
Niagara Falls Hydraulic Power & Manufacturing Co	5,530
Canadian Niagara Power Co	4,300
The Electrical Development Co	2,900
Ontario Power Co	3,700
International Railway Co	110
Total	24,810

The average and maximum importation of power into the United States from Canadian power companies in June, 1911, under the permits, are as follows:

	Average horsepower.	Maximum horsepower.
The Electrical Development Co	.....	10,000
Canadian Niagara Power Co	45,500	52,500
Ontario Power Co	38,000	48,000

The Electrical Development Co., under a contract which expired June 20, 1911, formerly transmitted power to Terminal B station at Buffalo in parallel with the Canadian Niagara Power Co.

The load was not continuous, being the peaks for short periods of the day only. These peaks reached a maximum of 9,000 to 10,000 horsepower. Since the expiration of the contract no power has been exported from the plant of The Electrical Development Co.

The Canadian Niagara Power Co. is transmitting its output principally to the United States side, delivering in varying but about evenly-divided amounts to the Niagara Falls Power Co. at Niagara Falls, N. Y., through conduits across the Upper Arch Bridge, and to Terminal B station at Buffalo over its transmission lines crossing the river from Fort Erie.

The transmission lines of the Ontario Power Co. entering the United States cross the Niagara River at the Lower Rapids, and the power is received by the Niagara, Lockport and Ontario Power Co. and distributed to Lockport, Syracuse, Rochester, etc.

The accompanying plate shows the location of the power lines and circuits entering the United States.

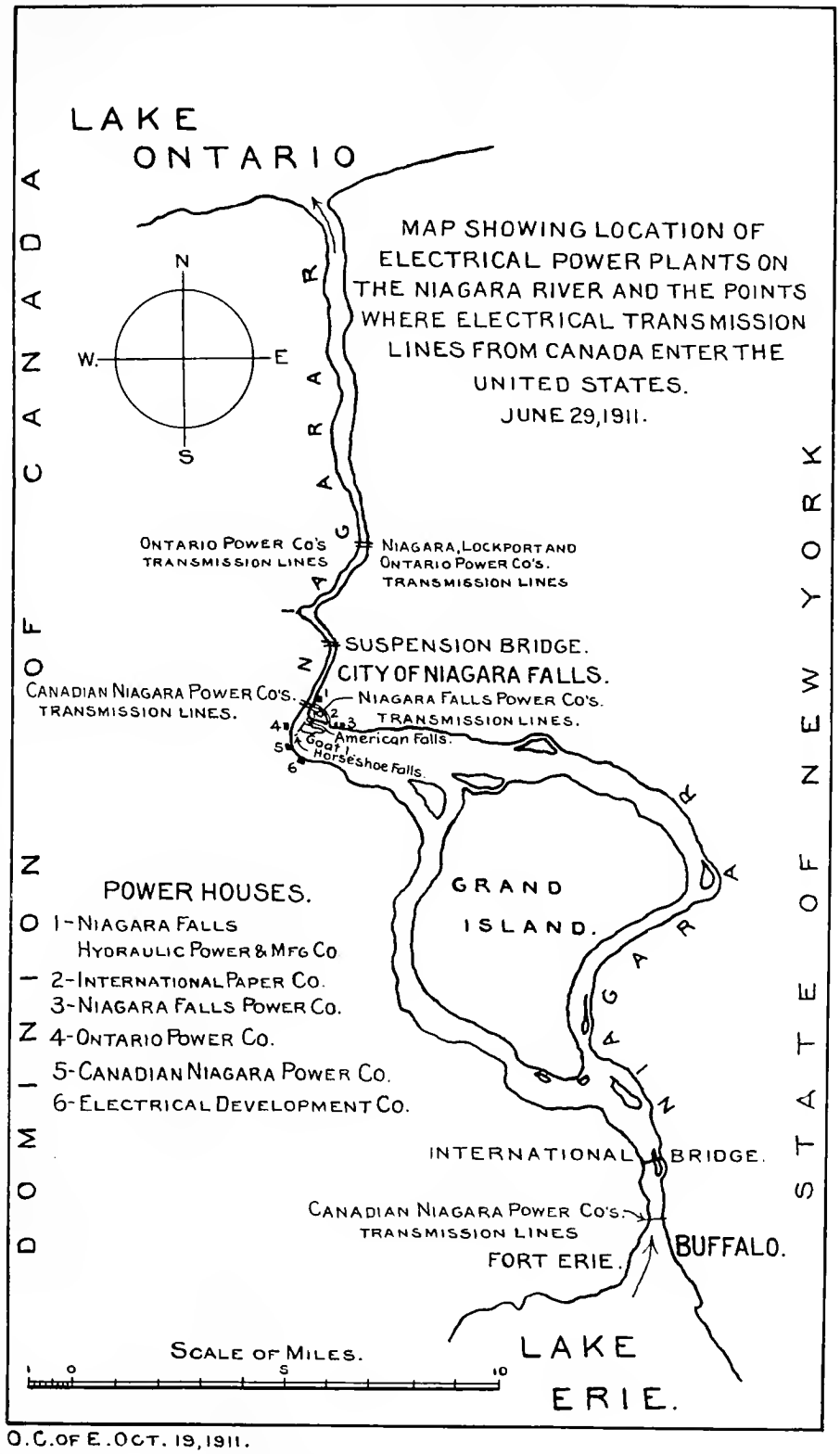
The following table shows the average amount of power being generated in June, 1911, by the several companies diverting water from the Niagara River and its tributaries, the mechanical efficiency at which each plant was then operated, and a comparison of the efficiencies based on the total fall from Grass Island-Chippawa pool to Suspension Bridge. Quantities given are only approximate, and the efficiencies of the Canadian plants and the corresponding diversions given in a previous table are mostly from information furnished by the companies, which has not been verified by the Lake Survey.

Company.	Power generated.	Operating head.	Efficiency.	Efficiency on basis of 220-foot head.
	Horsepower.	*Feet.*	*Per cent.*	*Per cent.*
Lockport Hydraulic Co.	1,110	49	50	11
Niagara Falls Power Co	78,000	138	63	40
Niagara Falls Hydraulic Power & Manufacturing Co	85,900	205	67	62
Canadian Niagara Power Co.	48,700	140	71	45
The Electrical Development Co	23,500	135	53	33
Ontario Power Co.	60,300	[1] 193	74	65
International Railway Co.	500	64	63	18
Total	298,010	([2])	.....	48

[1] The effective head of the Ontario Power Co. is dependent upon the relation between power development and capacity of conduits and will eventually be about 180 feet.
[2] Weighted mean efficiency.

While the efficiencies of individual power developments indicated above are possibly in error and may not be a fair basis of comparison as between the several companies, the average, which is fairly correct, indicates the possibility of a greatly increased economy of conversion. With continued restrictions in the use of water, improved operating conditions, and a more economical development of the natural energy may be expected.

In conclusion, it is due the several companies and their officers to express appreciation of their generous cooperation in making supervision easy and effective and of their courtesy in acceding to every suggestion or request from this office.



O.C. OF E. OCT. 19, 1911.

REPORTS OF THE NIAGARA FALLS COMMITTEE.

NEW YORK CITY, N. Y., *September 20, 1907.*

The Hon. WILLIAM H. TAFT,
Secretary of War, Washington, D. C.

SIR: In your opinion, dated January 18, 1907, in the matter of applications under the Burton Act for the issue of permits for the diversion of water from the Niagara River and for the importation of electrical power from Canada into the United States, you appointed a committee to advise you what changes, at an expense not out of proportion to the extent of the investment, could be made on the American side of the canyon, below the Falls, which would put it in natural harmony with the Falls and the other surroundings, and which would conceal, as far as possible, the raw commercial aspect of that region.

The committee as first appointed consisted of Mr. Charles F. McKim, Mr. Frank D. Millet, and Mr. F. L. Olmsted. By a subsequent order, dated March 20, 1907, Capts. John S. Sewell and Charles W. Kutz, Corps of Engineers, United States Army, were detailed as additional members of this committee.

The committee now has the honor to submit a brief progress report of its operations up to the present time.

The committee held its first meeting at 10 a. m., March 19, 1907, in the office of Mr. Charles F. McKim, in New York City, at which the Secretary of War was present. Captain Sewell and Captain Kutz were also present, though not designated as members of the committee until the following day.

The Secretary of War requested the committee to go to the Falls and make a careful study of the situation, with the object of ultimately submitting to him a comprehensive report on the subject.

Copies of the most recent maps of the Falls and its vicinity were obtained from the Lake Survey and Geological Survey, and cadastral maps of the American side of the canyon below the bridge were obtained from the American power companies.

The committee spent three days at the Falls, April 4, 5, and 6, and made a very thorough examination of the situation from a scenic and architectural standpoint.

Commissioner Porter, of the Niagara Falls State reservation, placed a room in the Administration Building at the disposal of the committee and facilitated its work in every possible way.

The committee is also indebted to the Hon. Peter A. Porter, Member of Congress from that district, for valuable assistance in its work.

Arrangements were made with a local photographer to furnish the committee with a series of photographs showing the conditions at different points in the gorge, and interviews were had with representatives of the American power companies.

The Niagara Falls Hydraulic Power & Manufacturing Co. owns or controls, or is directly interested in, most of the property on the American side of the gorge, below the bridge, and it was at this point that the most objectionable conditions existed.

At numerous points in this region solid and liquid refuse was being wasted over the edge of the bluff, and, due to this, the natural growth on the talus slope had been practically destroyed.

This same company has in progress the construction of a new power house, known as No. 3. The committee was unanimously of the opinion that the scenic conditions would be greatly improved by modifying the design of the power-house wall so as to reduce the scale of units in elevation, and by substituting coursed rubble for concrete in the power-house walls and in the screen walls inclosing the penstocks.

Meetings were held in New York City on April 29, May 2, and June 3, at which modified designs for the power-house and screen wall were considered.

During the month of May Captain Sewell, as a representative of the commission, visited Niagara Falls for consultation with the representatives of the Hydraulic Company and, as a result of his negotiations, a memorandum was prepared for the Secretary of War, setting forth a plan by which the objectionable features in the power-house design could be corrected, together with an estimate of the cost of making these changes.

Mr. Olmsted also visited the Falls during this period to look at the planting that had been started on the talus slope by the Hydraulic Company and to examine into the conditions controlling possible further steps for the restoration of vegetation in the gorge.

The memorandum above referred to was duly considered by the Secretary of War at a hearing held by him in New York City on June 27, 1907, at which the commission, as well as representatives of the Hydraulic Company, were present.

As a result of this hearing, the company agreed to make the desired modifications and further agreed to stop the wasting of liquid and solid refuse over the edge of the cliff and to restore the natural growth wherever possible on the part of the talus under its control.

The obligations which this company assumed are set forth in detail in certain correspondence had with Captain Sewell, copies of which have been forwarded to the Chief of Engineers for the information of the department.

At the last meeting of the committee, July 16, 1907, the proposed forms of permits to the different companies were presented to the committee, and the following clauses, bearing upon scenic conditions, were formally approved:

1. *Niagara Falls Power Co.*—The grantee shall, as far as possible, restore the natural conditions on its property, below the upper arch bridge, by removing the tar and other waste materials, which mar the beauty of the gorge, and by replanting the talus slope.

2. *Niagara Falls Hydraulic Power and Manufacturing Co.*—The grantee shall carry out in good faith the obligations which it assumed in its letters to the War Department, or to the representatives of that department, concerning the improvement of the scenic conditions on the American side of the gorge below the upper arch bridge.

3. *Niagara Falls Electrical Transmission Co.*—One of the objects of the law being the preservation of the natural scenic conditions of the falls and the gorge, it is stipulated that the plans for carrying the power across the international boundary be submitted to the Secretary of War for approval before work is undertaken. For the same reason it is further stipulated, that no steps be taken by the grantee, or its allied interests (as disclosed in its application for a permit), toward the construction of another bridge across the Niagara River.

4. *Niagara, Lockport & Ontario Power Co.*—One of the objects of the law being the preservation of the natural scenic conditions of the falls and the gorge, it is stipulated that the grantee shall, either directly or through the Ontario Power Co., take steps to restore the natural growth on the sides of the gorge, where power is now brought into the United States. It is further stipulated that no additional power crossings shall be undertaken until the plans therefor have been approved by the Secretary of War.

No clause bearing upon scenic conditions was incorporated in the transmission permit of the Niagara Falls Power Co.

The committee having been advised by the Secretary of War that it would be continued for an indefinite period, a permanent organization was effected at its meeting of July 16th by the election of Mr. Charles F. McKim as chairman and Capt. Charles W. Kutz as secretary. Mr. F. D. Millet was designated as chairman pro tem during the absence of Mr. McKim in Europe.

At this meeting a committee was appointed to prepare a draft of a report,[1] which in due course will be submitted to the department.

Respectfully submitted.

F. D. MILLET, *Chairman pro tem.*

THE NIAGARA FALLS COMMITTEE,
Washington, October 2, 1911.

The Honorable the SECRETARY OF WAR.

SIR: I have the honor to submit herewith the annual report of the Niagara Falls Committee.

Yours, respectfully,

F. D. MILLET, *Chairman.*

[1] See report of April 15, 1908, printed in H. Doc. No. 431, 61st Cong., 2d sess.

The Honorable the SECRETARY OF WAR,
Washington, D. C.

SIR: 1. Complying with the instructions of your letter of September 11, 1911, to Mr. F. D. Millet, chairman, the Niagara Falls Committee has the honor to submit the following report of its operations since its previous report of April 5, 1909, together with a résumé of all its operations to date.

2. This committee was originally appointed and its duties prescribed in the opinion of the Hon. W. H. Taft, then Secretary of War, dated January 18, 1907. The following extract from that opinion specifically bears upon the appointment and duties of the committee:

As the object of the act is to preserve the scenic beauty of Niagara Falls, I conceive it to be within my power to impose conditions upon the granting of these permits, compliance with which will remedy the unsightly appearance that is given to the American side of the canyon just below the Falls on the American side where the tunnel of the Niagara Falls Power Co. discharges and where the works of the Hydraulic Co. are placed.

The representative of the American Civic Association has properly described the effect upon the sightseer of the view toward the side of the canyon to be that of looking into the back yard of a house negligently kept. For the purpose of aiding me in determining what ought to be done to remove this eyesore, including the appearance of the buildings at the top, I shall appoint a committee consisting of Charles F. McKim, Frank D. Millet, and F. L. Olmsted to advise me what changes at an expense not out of proportion to the extent of the investment can be made which will put the side of the canyon at this point from bottom to top in natural harmony with the Falls and the other surroundings and will conceal as far as possible the raw commercial aspect that now offends the eye. This consideration has been kept in view in the construction of works on the Canadian side and in the building of the Niagara Falls Power Co. above the falls. There is no reason why similar care should not be enforced here.

3. The committee named above was afterwards increased by the detail of Capts. John Stephen Sewell and Charles W. Kutz, Corps of Engineers, United States Army, as additional members by an order of the Secretary of War, dated March 20, 1907.

4. The original personnel of the committee has been altered by the death of Mr. C. F. McKim on September 14, 1909, and by the relief of Capt. Kutz, who on August 10, 1908, was replaced by Maj. Charles Keller, Corps of Engineers, United States Army. Capt. (afterwards Major) Sewell has, since his appointment as member of the committee, resigned his commission as an officer of the Army, but still continues his membership in the committee.

5. Shortly after taking up its duties the committee was instructed in an interview with the Secretary of War that it was also authorized to consider "scenic and artistic conditions in a general way while preserving the essence of the definition of its duties as set forth in the Secretary of War's opinion of January 18, 1907."

6. Reports setting forth fully the nature of the objectionable features on the American side of the canyon at Niagara Falls and the possible remedies therefor, as well as the progress made in improving the conditions, were rendered on September 20, 1907, April 13, 1908, and April 5, 1909. The last two are printed in full in House Document No. 431, Sixty-first Congress, second session, and the other is on file in the War Department. In these reports is recorded all progress made up to the period covered in the present report.

7. Since the date of the last report (Apr. 5, 1909) the committee has held three meetings, one at Washington, D. C., on March 10, 1910, for the purpose of conferring upon certain matters brought before the committee by the president and secretary of the American Civic Association, and the others at Niagara Falls on August 22, 1910, and on June 22, 1911, both of the latter meetings being for the purpose of inspecting the improvements and changes undertaken at the suggestion of the committee.

8. Under the instructions of the Secretary of War the committee has been limited to demanding the improvement of objectionable conditions only in the case of the power companies to whom permits for the diversion of water or for the transmission of electrical energy from Canada into the United States were, under the terms of the act of June 29, 1906, issued by the Secretary of War, and control has been limited to the extent specifically provided in each permit. Beyond this the committee has been without power, so that many evidently objectionable features and practices remain to be remedied by the local authorities or through the force of a more enlightened public sentiment.

9. Specifically, under the terms of permits issued by the Secretary of War, the committee has been able to secure the following beneficial changes: The design of the power house No. 3 of the Niagara Falls Power & Manufacturing Co. (now the Hydraulic Power Co.) has been altered and the power house has been built under plans and with materials which serve to keep it in harmony with the site and the natural surroundings, while in no wise detracting from its usefulness. The penstocks leading downward from the brink of the cliff to this power house have been covered by a screen or curtain wall of rubble masonry built of stone broken from the cliff in the building operations. This wall, therefore, harmonizes in color and texture with the cliff itself. The dumping of waste and refuse from the cliff of the milling district has been discontinued, many unsightly structures have been removed, and much rubbish cleared away. The slopes of the banks between the highway bridge and power house No. 3 have also been cleared of the accumulated dumpings of years, and the planting of this bank and part of the slope below power house No. 3 has been very successful. Of the 15 streams of tail water discharging upon the bank of the milling district, 6 have been discontinued altogether and by the close of the present season 4 more will have disappeared. The large photographs herewith, marked "A" and "B," show the improvement effected in the milling district to the north of the highway bridge between June, 1907, and July, 1911, and in particular show satisfactory changes in the number and volume of the tail-water streams. These photographs have been furnished through the kindness of the Hydraulic Power Co. of Niagara Falls (formerly the Niagara Falls Hydraulic Power & Manufacturing Co.), as also the remaining photos herewith. Comparison will show the gratifying nature of the changes as follows:

Photo "C" shows the talus north of power house No. 3 after the bank had been cleared of rubbish, and "D" shows the slope as it is now.

Photos "E" and "F" serve to show original and present conditions between power house No. 2 and the highway bridge.

Photos "G" and "H" show original and existing conditions at the brink of the cliff and the great improvement which has been effected at this point.

Photo "I" gives a closer and better view of the plantations at the edge of the cliff. "J" is a view of the edge of the cliff back of the plant of the Cliff Paper Co., where the newly planted vines and shrubs have attained a luxuriant growth, and "K" shows similar success to the north of gate house No. 3 and near the plant of the Aluminum Co. of America.

10. It is plain that existing conditions in and near the milling district are greatly improved. These changes have been made partly at the expense of the Niagara Falls Power Co., which cooperated by planting its portal lot just north of the highway bridge, and, in much the larger part, at the cost of the Hydraulic Power Co. of Niagara Falls, which owns the power plants to the north of the bridge. The committee desires to express here its appreciation of the public spirit and liberality shown by these companies.

11. The following quotation from a letter of the Hydraulic Power Co. to the committee is a statement of what this company has accomplished and of its plans for the future and gives some details not previously mentioned:

> We beg to present the attached photos and call your attention to a series of photos marked "A," taken June, 1907, and an accompanying series marked "B," taken July, 1911, which, among other things, show the overflows over the bank and the outflow from the old power developments, which we have numbered from 1 to 13.
>
> We would say that by the end of this season No. 1, No. 3, No. 4, No. 5, No. 5½, No. 6, No. 7, No. 8, No. 12, and No. 13 will all be eliminated. No. 2 is the outlet of our ice run from Station No. 3, and will be used to some extent during the winter months. No. 9, No. 10, and No. 11 are the outflows from the Pettebone-Cataract Paper Co. and the Cataract City Milling Co., over which we have no control, but are using all the diplomatic effort we can to improve the conditions, and hope to be able to have No. 11 partially or all eliminated.
>
> We have changed both the large flour mills from hydraulic power to electrical power, and have also purchased the land on which the ruins are located, between the two above mills, and are now tearing them down, the photos already showing a great improvement. This will eliminate objectionable conditions at No. 3, No. 4, No. 5, and No. 5½, and we are planning to build a rough rubble wall between the two large mills and plant shrubbery in order to hide all structures between these two mills.
>
> We have also purchased the city waterworks, and this plant is about to be discontinued, which will eliminate No. 12, and it is our plan to tear out the old wooden facing about the outflow and replace it with a rubble wall.
>
> We are further planning to increase the number of shrubs back of both of the large mills, which will improve the present conditions at these places.

No. 13, which was the city sewer outlet north of our station No. 3, has been eliminated by being built into a tunnel.

We believe you will note a great improvement in appearances southerly from our station No. 2, especially back of the plants at the top of the hill, and in the increase in shrubbery on the bank.

The vertical strip in which the shrubbery does not show as luxuriant as in other places is due to the breaking away from the bank itself of some large bowlders during the past winter, which slid down the talus slope, carrying everything in their path before them, which has necessitated planting this section.

Also on the talus slope at the north end of our Station No. 3 the planting is beginning to show pleasing effect, and in a few years more we believe will practically cover the entire area in this section.

The concrete showing in the high bank wall back of station No. 3, in the "B" series, is now being covered with rubble, the scaffolding for its placing being clearly seen, and at the date of this letter is definitely in advance of the conditions shown in the photograph.

The concrete base of the power station No. 3 will undoubtedly be covered by the rubble wall already approved by your commission, and before the end of this season, which will make this part of the structure blend with the other parts.

The whole effect of station No. 3, including the station itself, the high bank wall, and the gate house at the top of the hill, we believe will be pleasing to your commission, as we have used every effort to make this structure as pleasing as possible, and its construction to the elevator will undoubtedly greatly improve the whole appearance.

We believe we can be justly proud of this structure, not only in its general scenic effect, but in the fact that it represents by far the highest efficiency use of water at Niagara Falls, not only in point of actual head available, but in the engineering accomplishments.

12. Under the terms of the permit issued to the Niagara Falls, Lockport & Ontario Power Co., for the transmission of electrical energy into the United States from Canada, this company was required to restore the natural growth on the side of the gorge where power is now brought into the United States. Recent visits by the members of the committee show that plantings made by this company are fairly prosperous and that the naked scar at the United States terminal of this power crossing is in a fair way to be covered with vegetation.

13. The only other permit carrying a restrictive clause in the interest of the preservation and protection of scenic conditions is that of the Niagara Falls Electrical Transmission Co., which is, under the terms of its permit, forbidden to build another bridge at or near the falls and is further required to secure the antecedent approval of the War Department for any power crossing it may propose to build. Up to the present, this company has built neither bridge nor power crossing. A bill introduced into Congress, presumably in its interest (S. 1727, 61st Cong.), was the subject of adverse report by the secretary of the committee on the ground that the bridge, therein proposed to be built about 500 feet north of the existing highway bridge, would be decidedly objectionable in its effect upon scenic conditions, and was moreover unnecessary, except for the purpose of such a power crossing as was forbidden by the above restrictive clause in the permit of the Niagara Falls Electrical Transmission Co.

14. Further than to supervise the construction of power house No. 3 of the Hydraulic Power Co., the cleaning and planting of the sides of the gorge in the milling district, and the plantings made on the east side of the power crossing of the Niagara Falls, Lockport & Ontario Power Co., the committee has been able to do practically nothing to remedy the deplorable conditions existing elsewhere on the American side of the canyon north of Niagara Falls. Apparently the situation is beyond national control, except through the creation of the national reservation recommended in House Document No. 431, Sixty-first Congress, second session. In the absence of such reservation, or of similar effective action by the State of New York, vandalism will continue unchecked. The most recent instance of the kind is the installation by the Gorge Railway Co. of a stone crusher at the site of an ancient slide or slip about a half mile north of the power crossing of the Niagara, Lockport & Ontario Power Co. Close examination shows no trace of extensive destruction of vegetation, but the small amount remaining, or which has grown up since the slide or slip which caused the original scar, has been considerably damaged by the company's operations. A number of trees and shrubs have been killed and others have been barked and injured. Some of the trees and stumps are still seen in place near the stone crusher. The damage done by the operations of the company is shown, in part, by photographs Nos. 1, 2, 3, and 4, herewith, as follows:

No. 1. Rocks being dug from the bank just above stone crusher.

No. 2. Rocks collected for crusher, looking down steep bank to crusher plant.

No. 3. Looking up from crusher toward No. 2.

No. 4. View of the stone-crushing plant, taken from the Canadian side of the gorge.

15. At the Whirlpool Rapids recently the scenery has been needlessly damaged and much vegetation destroyed in erecting on private land an ugly staircase, a fence, and other structures, as shown in photographs No. 5 and No. 6. Such damage will continue so long as private selfishness and cupidity remain unrestrained.

For the committee:

Respectfully submitted.

F. D. MILLET, *Chairman.*

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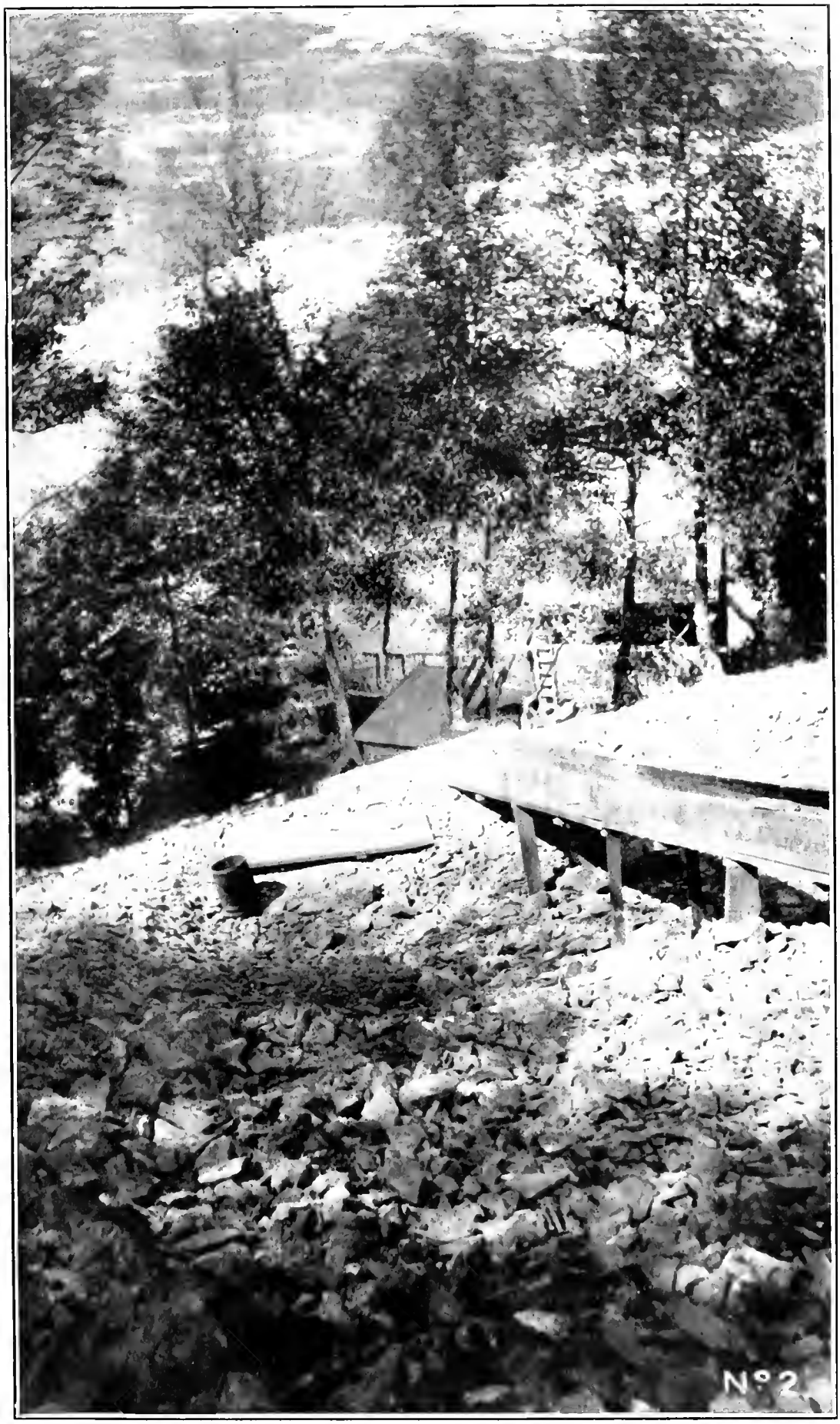
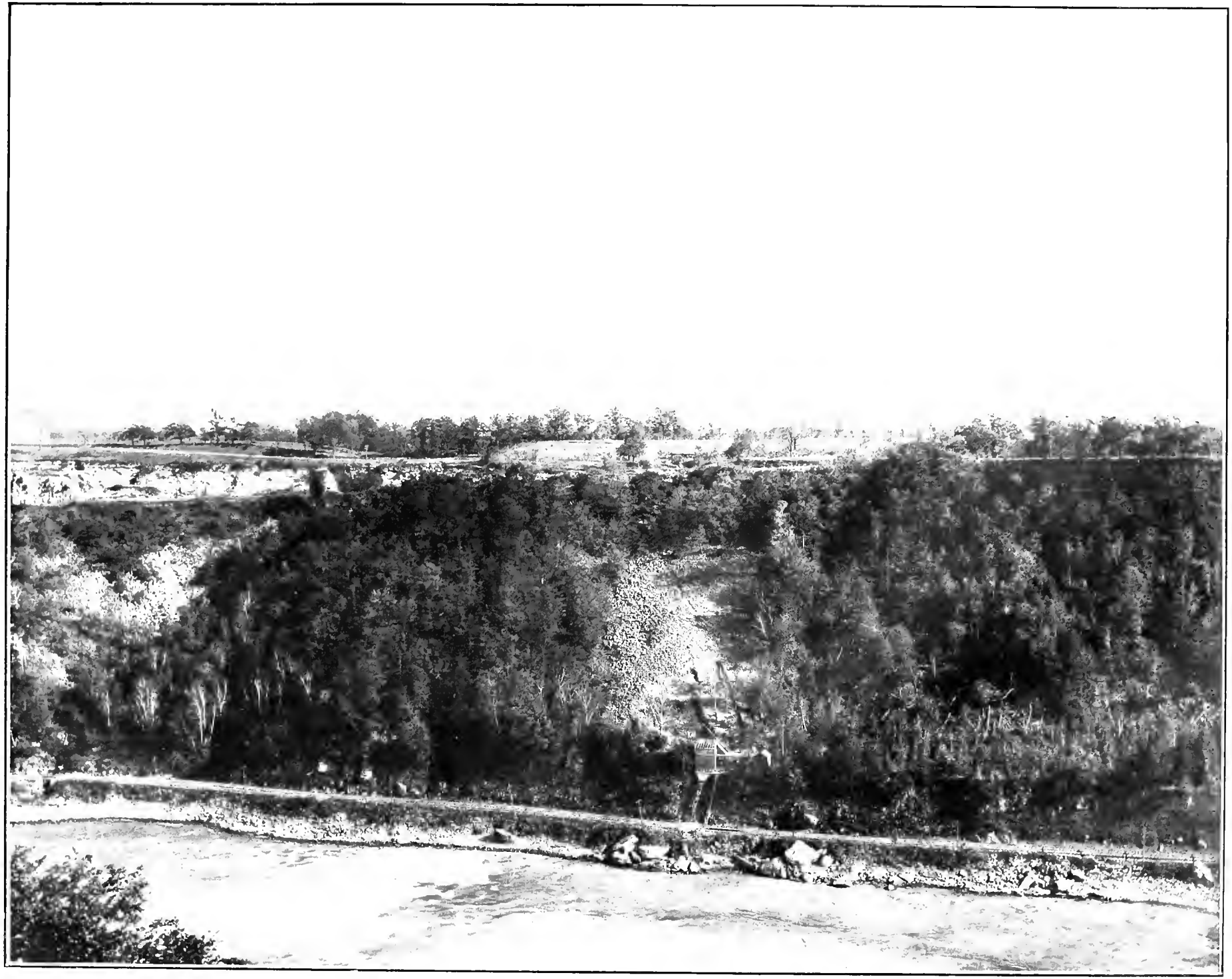
1. ROCKS BEING DUG FROM BANK JUST ABOVE STONE CRUSHER.



2. ROCKS COLLECTED FOR CRUSHER, LOOKING DOWN STEEP BANK TO CRUSHER PLANT.

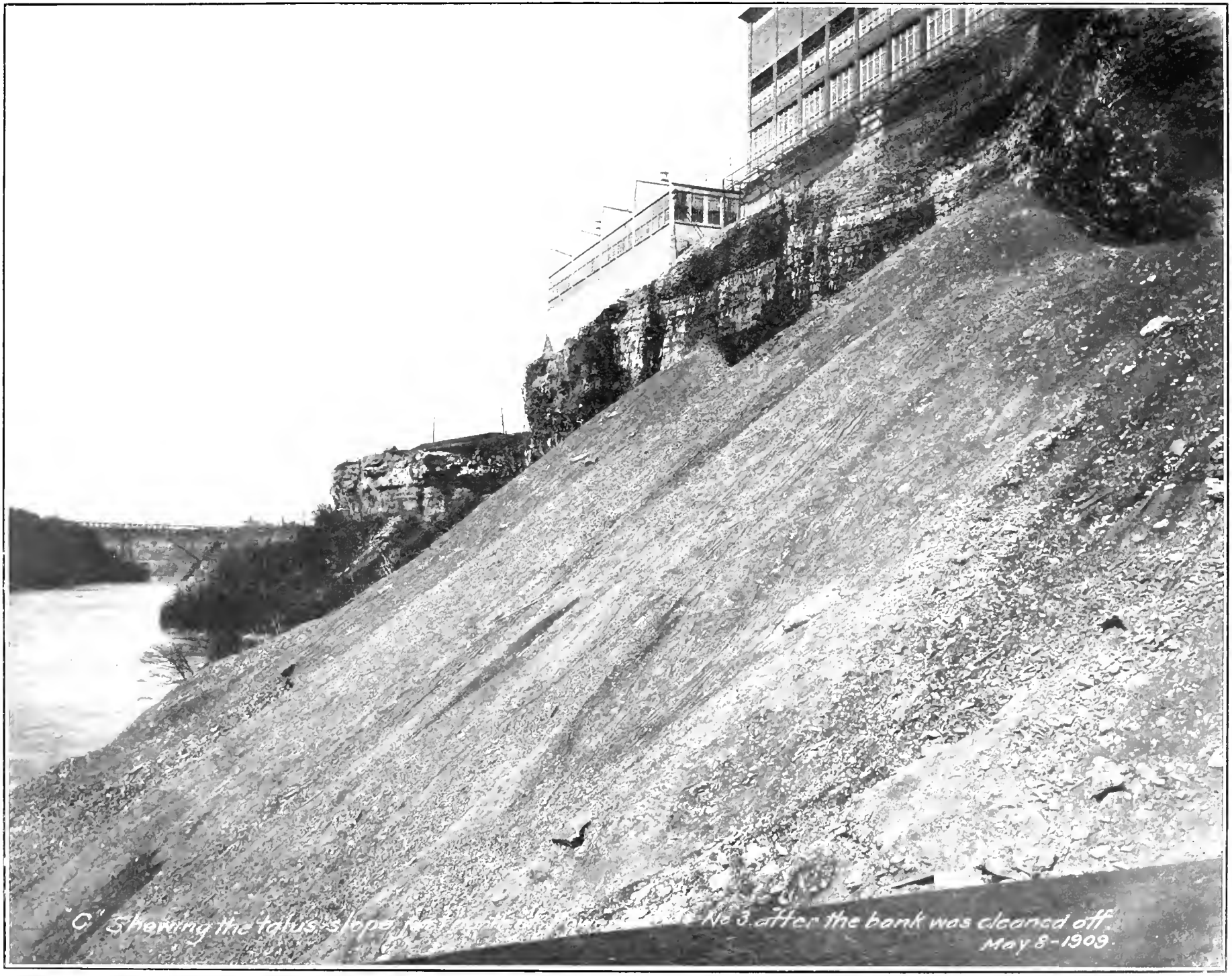
3. LOOKING UP FROM CRUSHER TOWARD NO. 2.

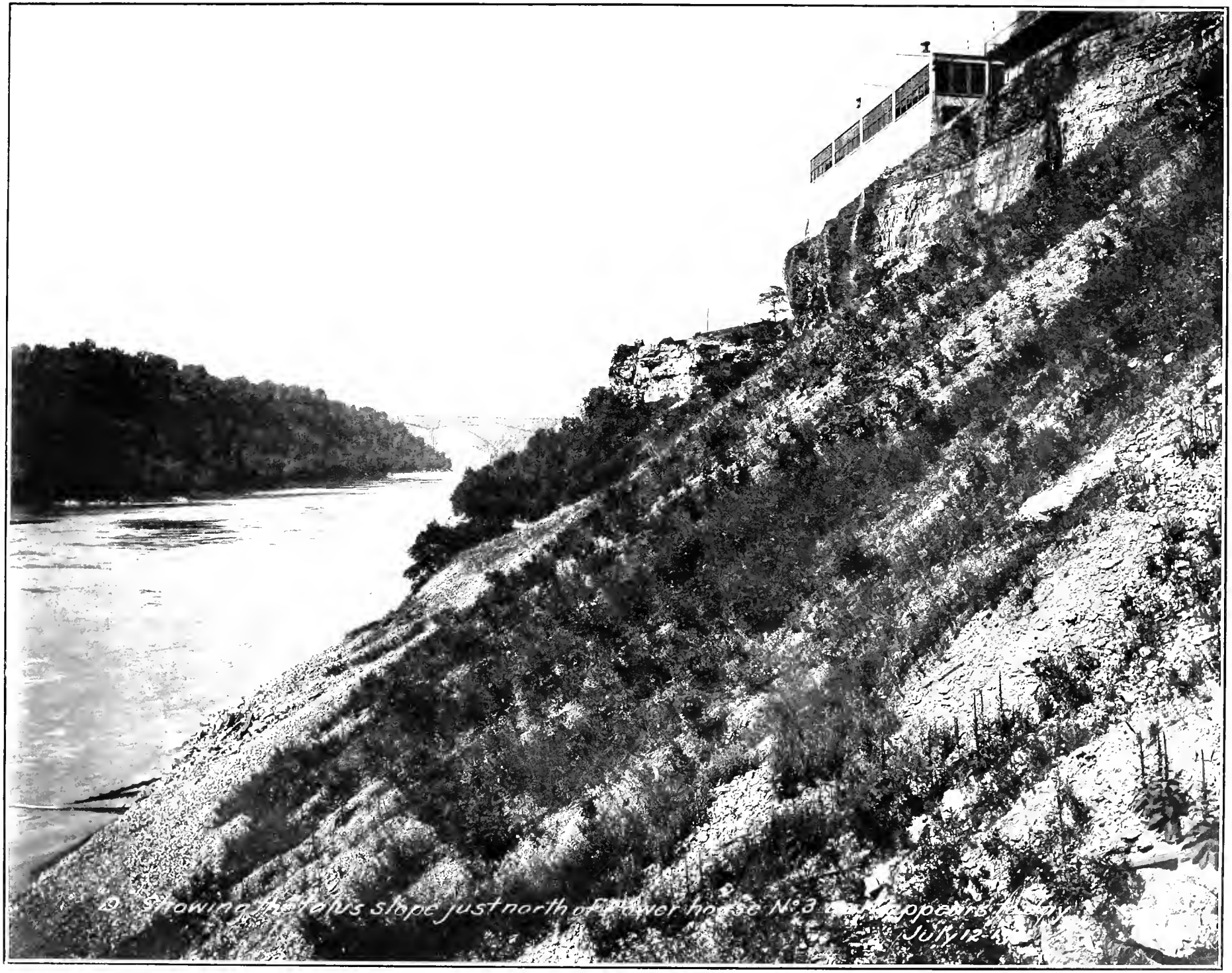


4. VIEW OF THE STONE CRUSHING PLANT TAKEN FROM THE CANADIAN SIDE OF THE GORGE.

5. STRUCTURES ON PRIVATE LAND NEAR WHIRLPOOL RAPIDS.

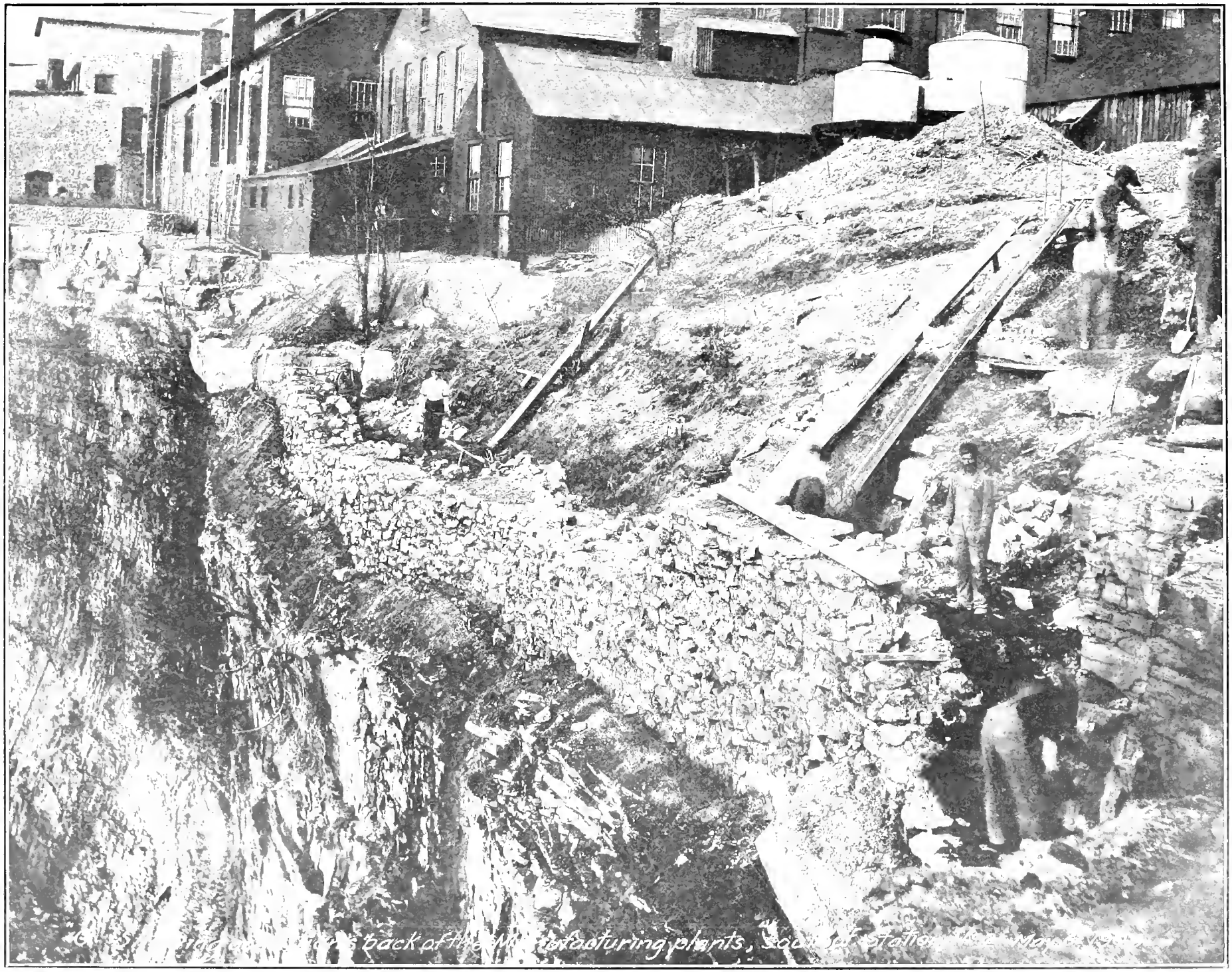
6. STRUCTURES ON PRIVATE LAND NEAR WHIRLPOOL RAPIDS.

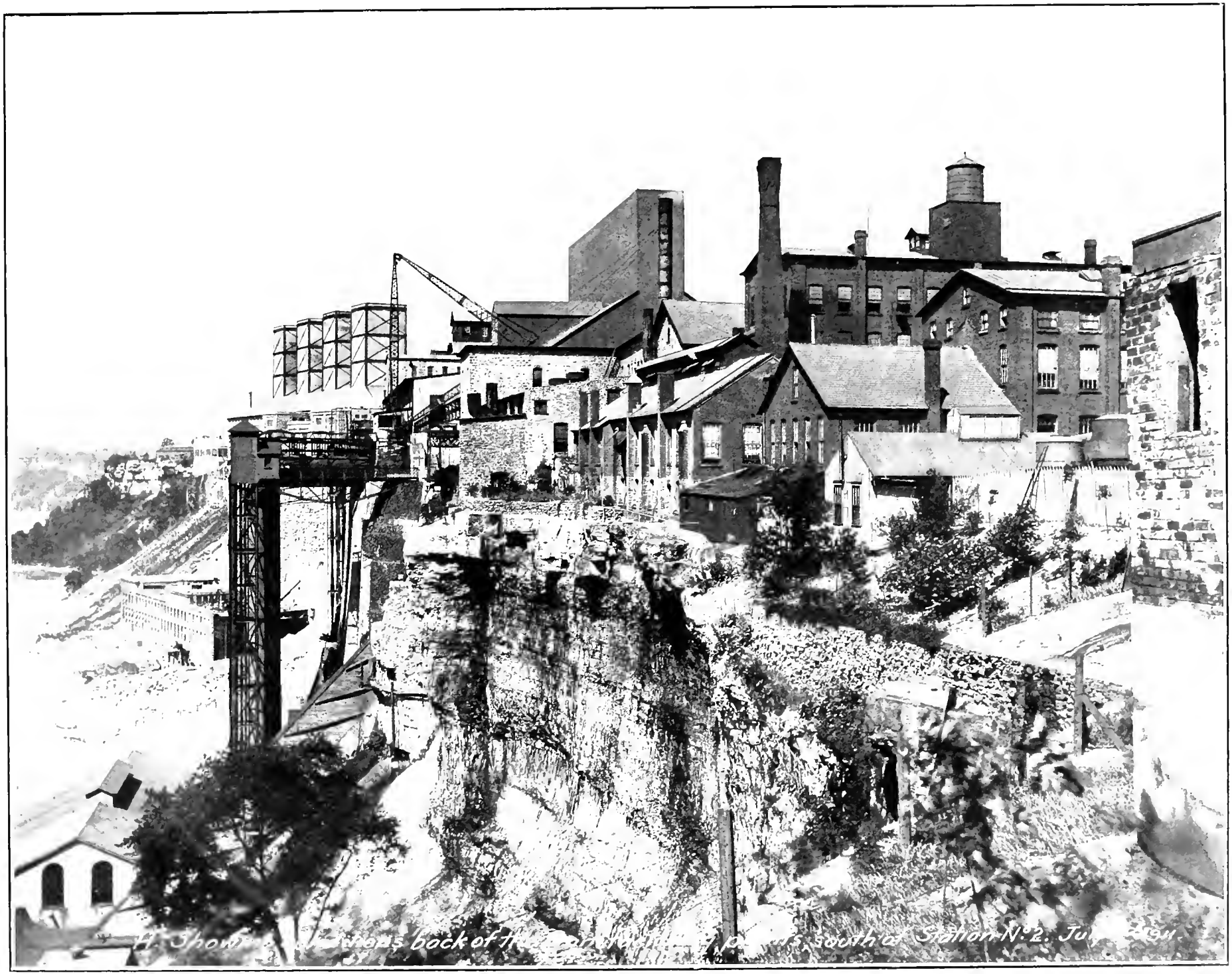

"C" Showing the talus-slope
No 3. after the bank was cleaned off.
May 8-1909.

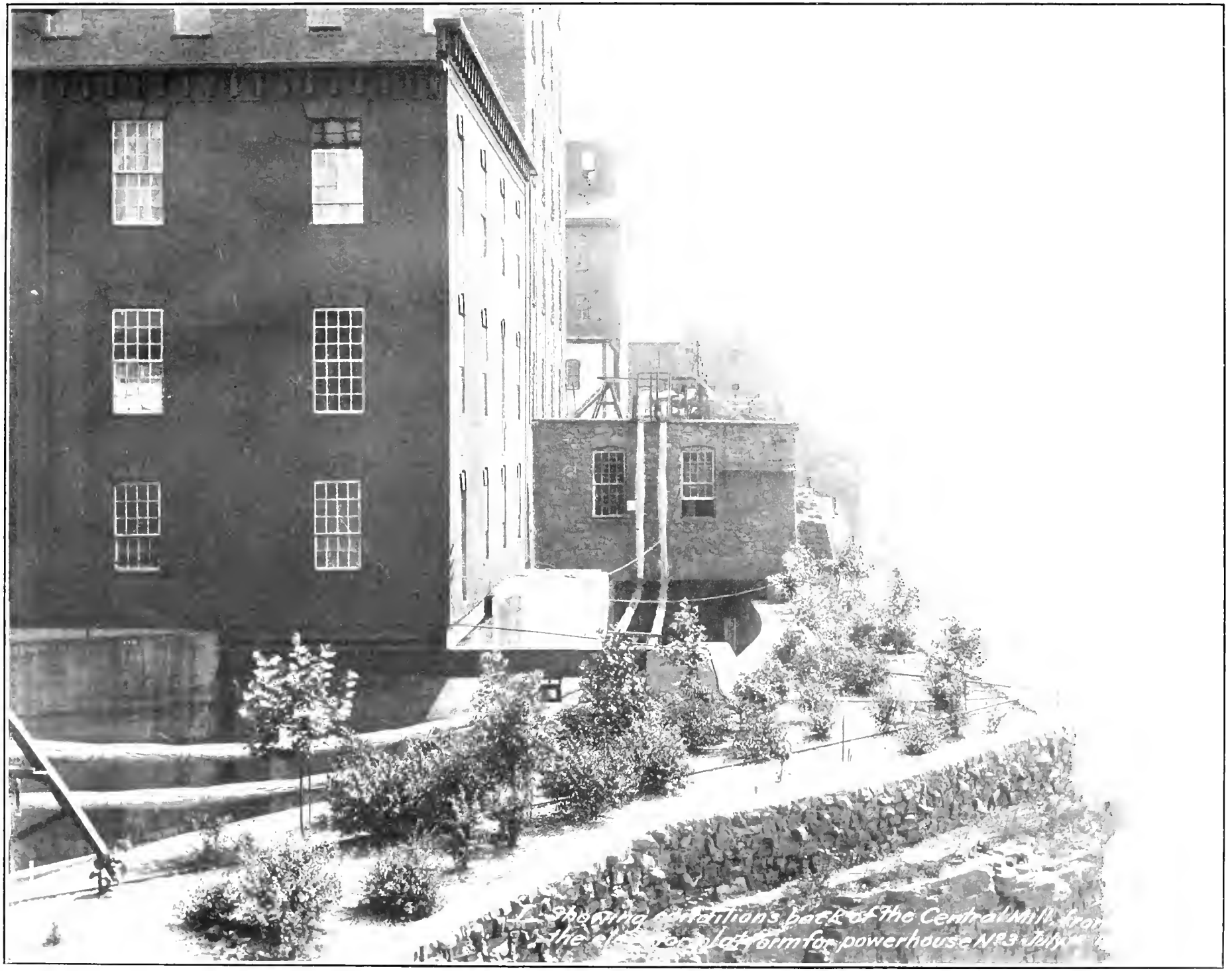

July 12

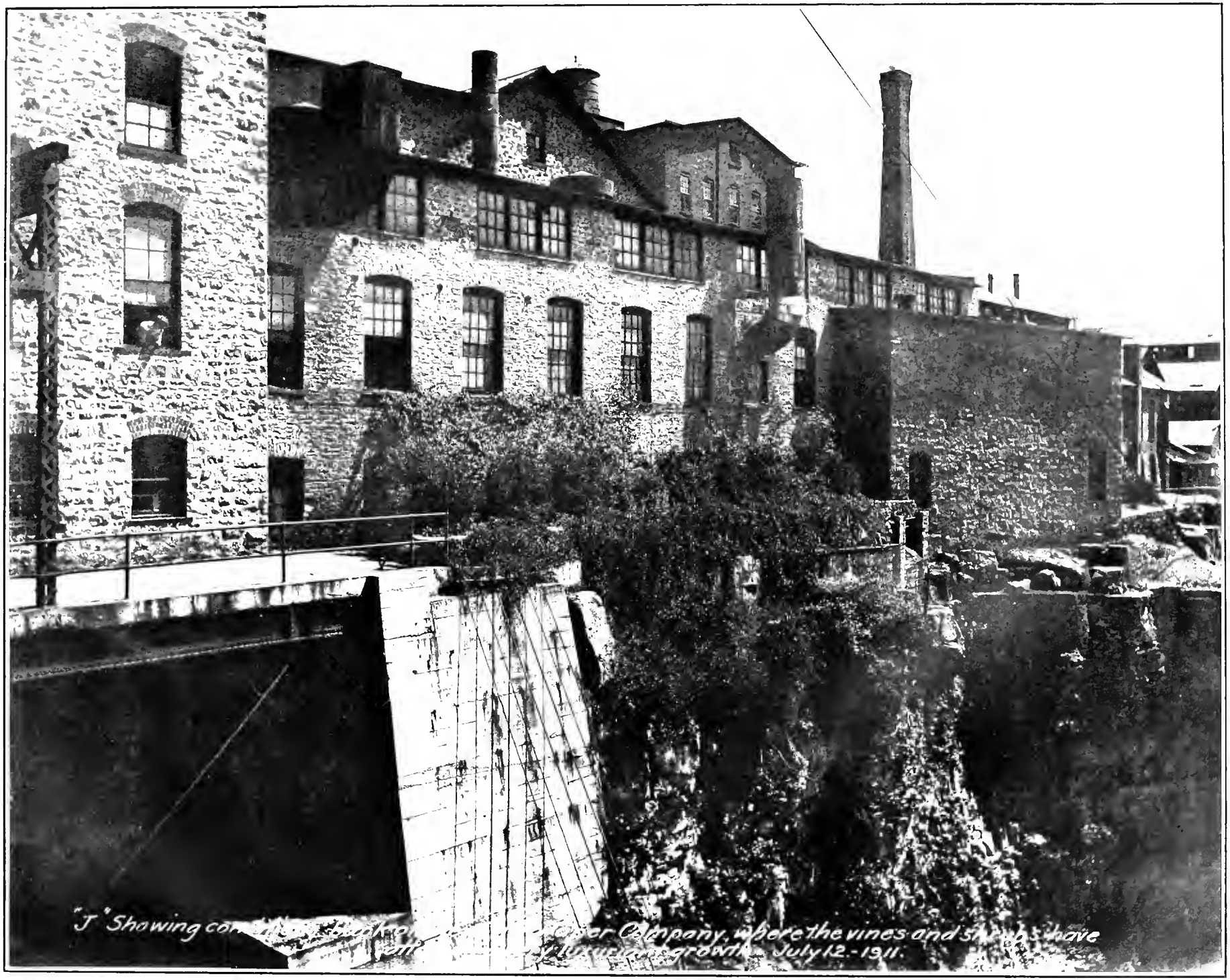

E Showing talus slope north of highway bridge. May 8

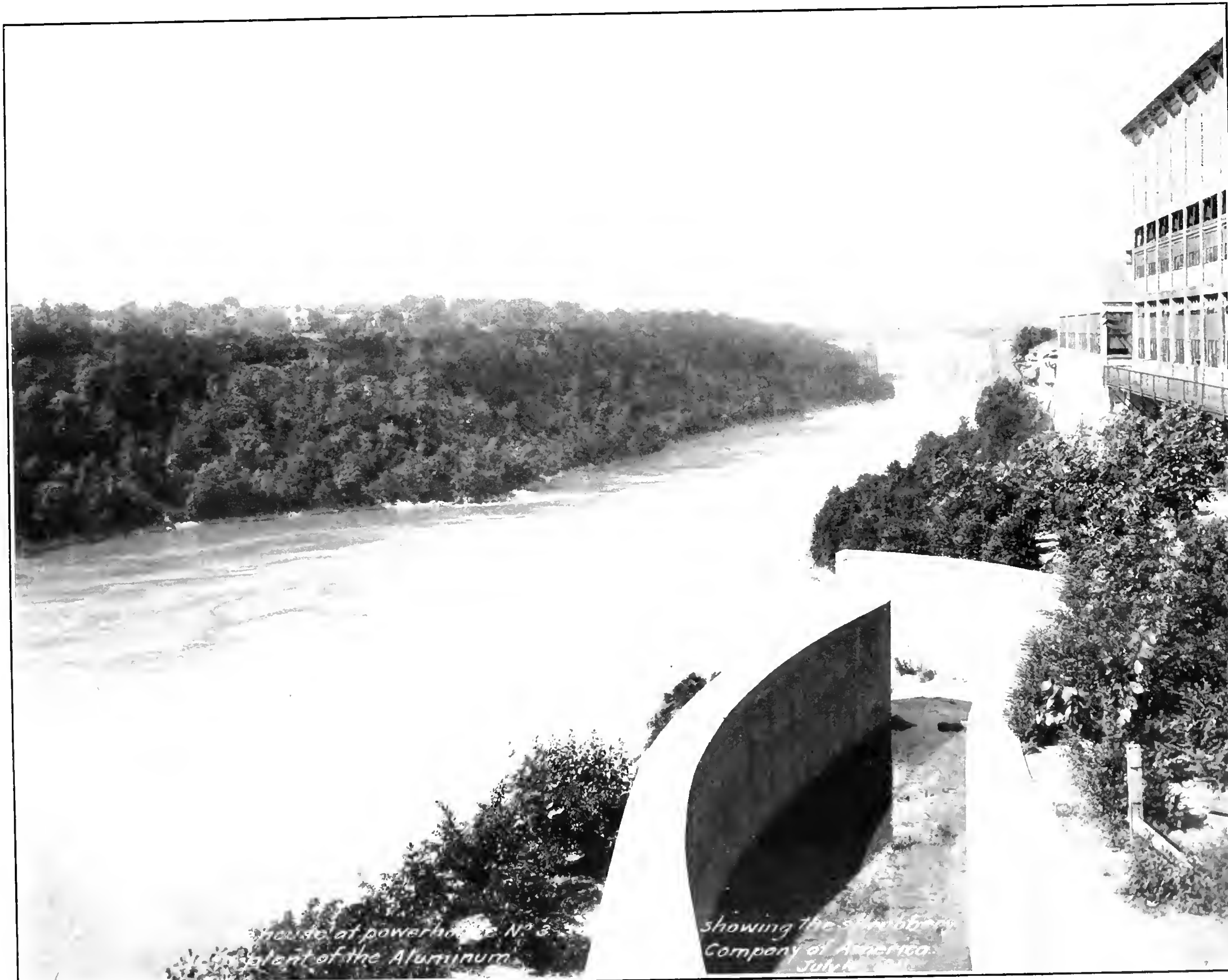
Bridge
F Showing talus slo

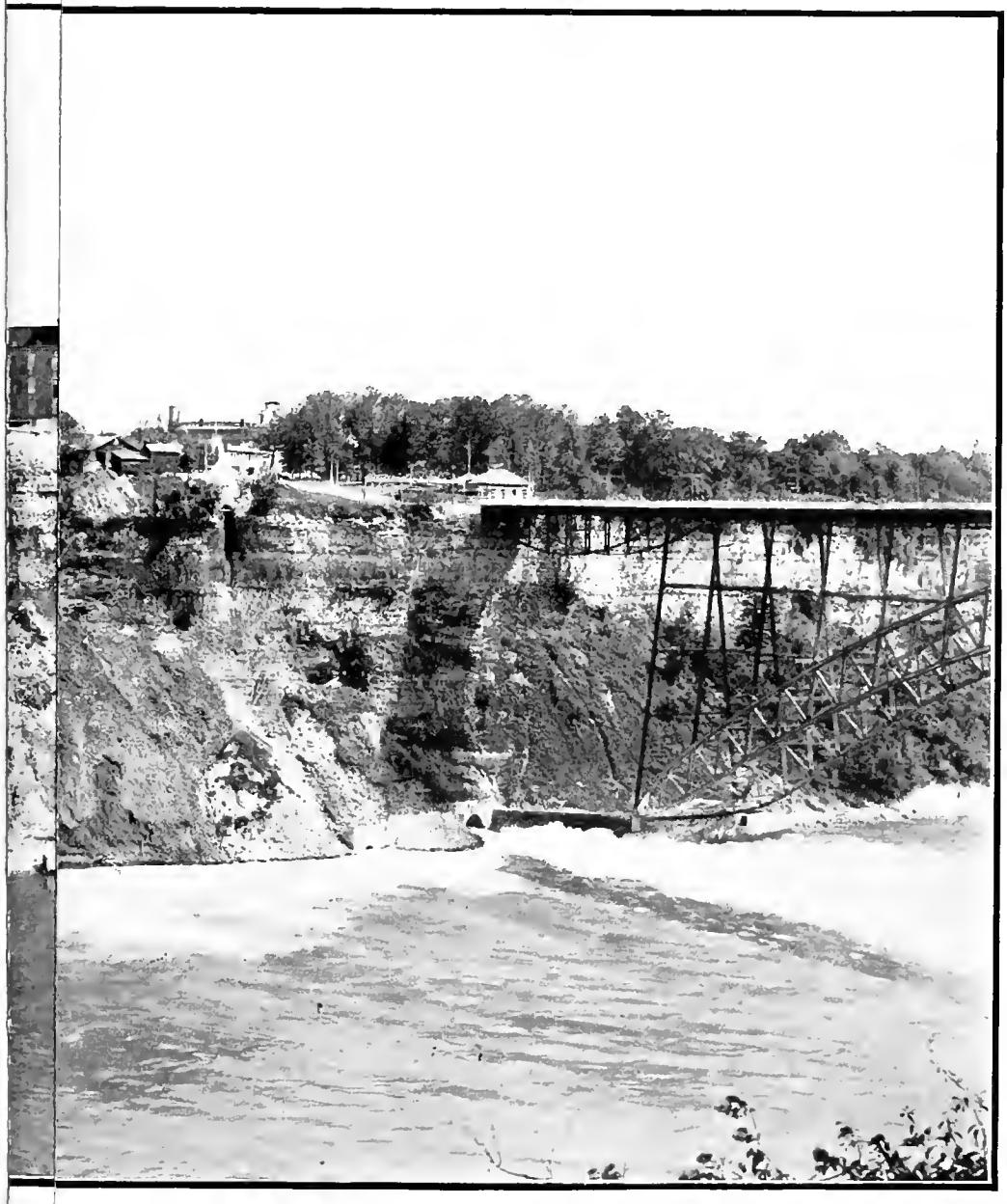




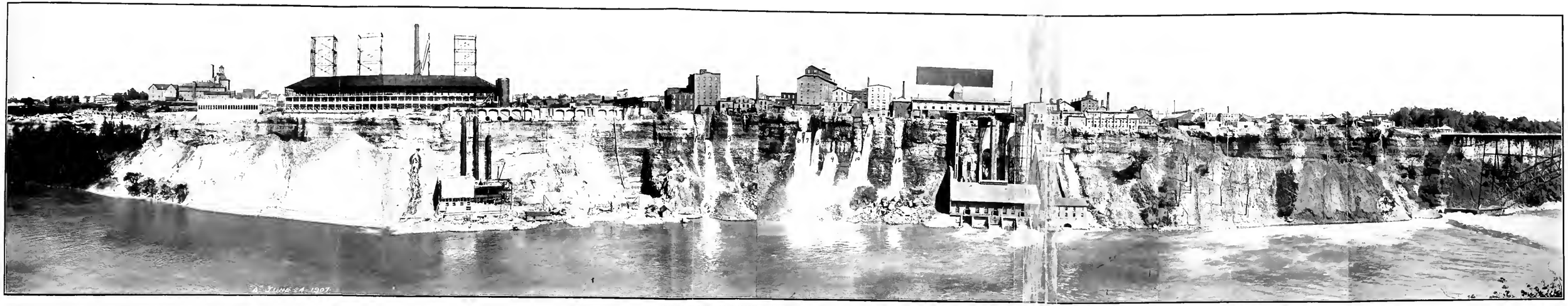





showing the
of the Aluminum
Company of America.

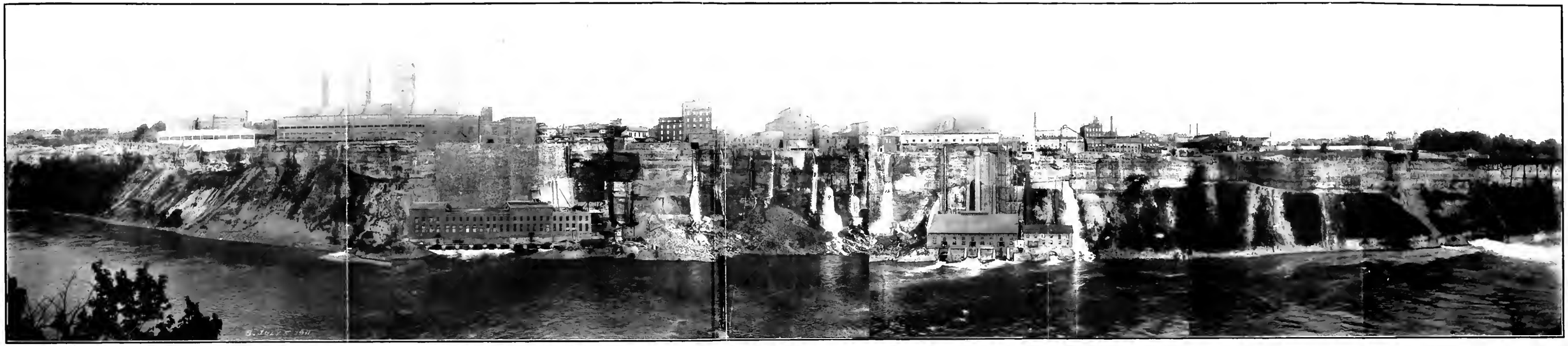


VING



A VIEW SHOWING IMPROVEMENT EFFECTED IN MILLING DISTRICT NORTH OF HIGHWAY BRIDGE, JUNE 24, 1907

MPRC



B VIEW SHOWING IMPROVEMENT EFFECTED IN MILLING DISTRICT NORTH OF HIGHWAY BRIDGE, JULY 5, 1911

Walker